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Green Roofs: A Resource Manual for Municipal Policy Makers

Figure 1 Karen Liu on the National Research Council's green roof test hut in Ottawa

INTRODUCTION

This Manual is an overview of international and Canadian green roof policies and programs. By reviewing the reasons municipalities throughout the world have set green roof policies and programs, policy makers can better determine which policies suit their needs.

European jurisdictions have long used green roof technology for stormwater management, to reduce energy use in buildings and to increase amenity space. Green roofs are gaining acceptance throughout North America as knowledge of the environmental benefits and the technology for green roofs improve.

In Europe, intensively competitive market forces are driving development of green roof technology. These forces include years of accumulated research on membrane technology, roof design and plant performance. Social ideals in Europe that value environmental protection and increasing green space in urban areas also drive development of green roof technology.

Canada does not have the same social conditions and market forces as Europe, but Europe's experience has lessons for Canadian municipalities considering green roof policy. This Manual gives North American and world examples. From these, policy makers may find a good fit for their situations.

Green roofs are most often one feature of wide-ranging policies and programs that promote more green space in dense urban areas and that propose alternatives to standard stormwater infrastructure.

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RESEARCH PROGRAM

This Manual features 12 jurisdictions that demonstrate leadership in green roof policy development. These jurisdictions have successfully established supportive programs and succeeded in significantly advancing the green roof movement in their communities.

Discussion of 13 additional jurisdictions with less developed green roof policies also has useful insights and benchmarks to give a more complete picture of green roof development. Understanding the motivating influences behind the widespread application of green roofs is the key to developing programs supporting the technology.

An advisory committee made up of representatives from across Canada guided the Manual's research team. The committee was essential in selecting the example jurisdictions and advised on the content of each case study.

The advisory committee and the research team picked the 12 jurisdictions because of the maturity and type of their green roof policies or programs, key motivators and their success in promoting green roofs.

The *Manual* features the following municipalities:		
Canada	**United States**	**International**
Montréal	Chicago, Ill.	Basel-City, Switzerland
Toronto	New York City	Münster, Germany
Vancouver	Portland, Ore.	Singapore, Asia
Waterloo		Stuttgart, Germany
		Tokyo, Japan

Figure 2 Green Roof test on Toronto's City Hall

Green roof policy and programs in each municipality are unique to the local climate, political position, environmental motivators and resource capacity. To capture the different approaches and diverse nature of green roof programs, the following headings highlight activities in the selected jurisdictions:

- Description of jurisdiction
- Key motivators
- Green roof policy
- Process to establish policy
- Effectiveness
- Lessons learned
- Future predictions
- Applicability to Canada (international jurisdictions only).

The key motivators are the need to:

- Control stormwater runoff
- Reduce urban heat-island effect
- Lower building energy consumption
- Reduce air pollution
- Increase green amenity space
- Maintain biodiversity
- Reduce escalating infrastructure costs.

The *Manual* outlines six phases in setting appropriate green roof policies and programs:

- Introductory and awareness
- Community engagement
- Action plan development and implementation
- Technical research
- Program and policy development
- Continuous improvement

Municipalities can use many tools and incentives to encourage implementation of green roofs and stimulate the local market. They include:

- Education and champions
- Indirect financial incentives
- Direct financial incentives
- Regulatory measures
- Performance rating systems
- Building codes and regulations

IMPLICATIONS FOR CANADIAN MUNICIPALITIES

Municipal policy makers will benefit from the extensive information provided in the manual that supports green roof infrastructure in Europe and North America. The numerous case studies provide ample documentation to help Canadian regulators construct their own policy directions. Most important are the descriptions of *Why support green roofs* and *How to support green roofs*. Through demonstration and monitoring, public education, technical support, incentives and regulation, different jurisdictions have found ways to promote green roofs as infrastructure and lessen the negative effects of their urban growth. Readers will also benefit from the extensive list of resources for Green Roofs and Sustainable Buildings.

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Housing Research at CMHC

Under Part IX of the *National Housing Act*, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research.

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